Shuttle Small Payloads Project Office
1999 Symposium

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GAS Payloads Flown Since Last Symposium

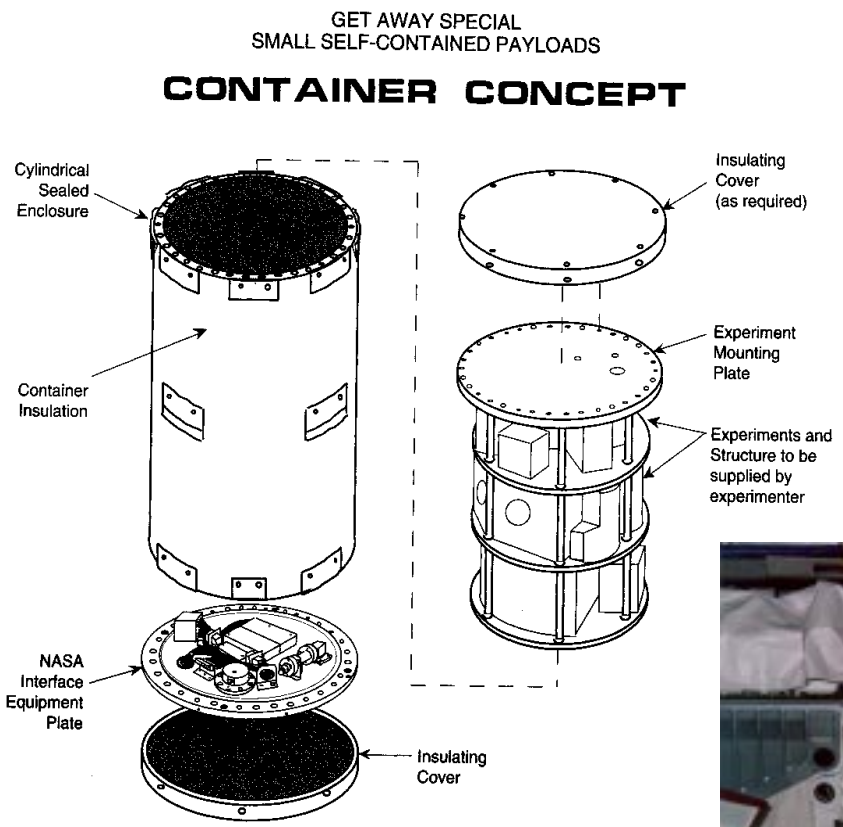
- Last Symposium (Sept 25-28, 1995)

• G342, G456, G740	STS-72	01/11/96
• G312	STS-76	03/22/96
• G056, G063, G142, G144, G163, G200, G490, G564, G565, G703, G741	STS-77	05/19/96
• ***G572***, G745	STS-85	08/07/97
• ***G036***	STS-87	11/19/97
• ***G093***, G141, G145, G432	STS-89	01/22/98
• G744, G197, ***G772***	STS-90	04/17/98
• ***G090***, ***G743***, G648, G765	STS-91	06/02/98
• ***G238***, ***G779***, G467, G764	STS-95	10/29/98
• ***G093R***	STS-88	12/04/98

Agenda

- GAS Program Status
- Flight Opportunities?
  - International Space Station (ISS) Impact
- Changes to GAS in 2000 and Beyond
  - Revision of Policy Governing GAS
  - GAS Documentation Updates
  - GAS Hardware Updates

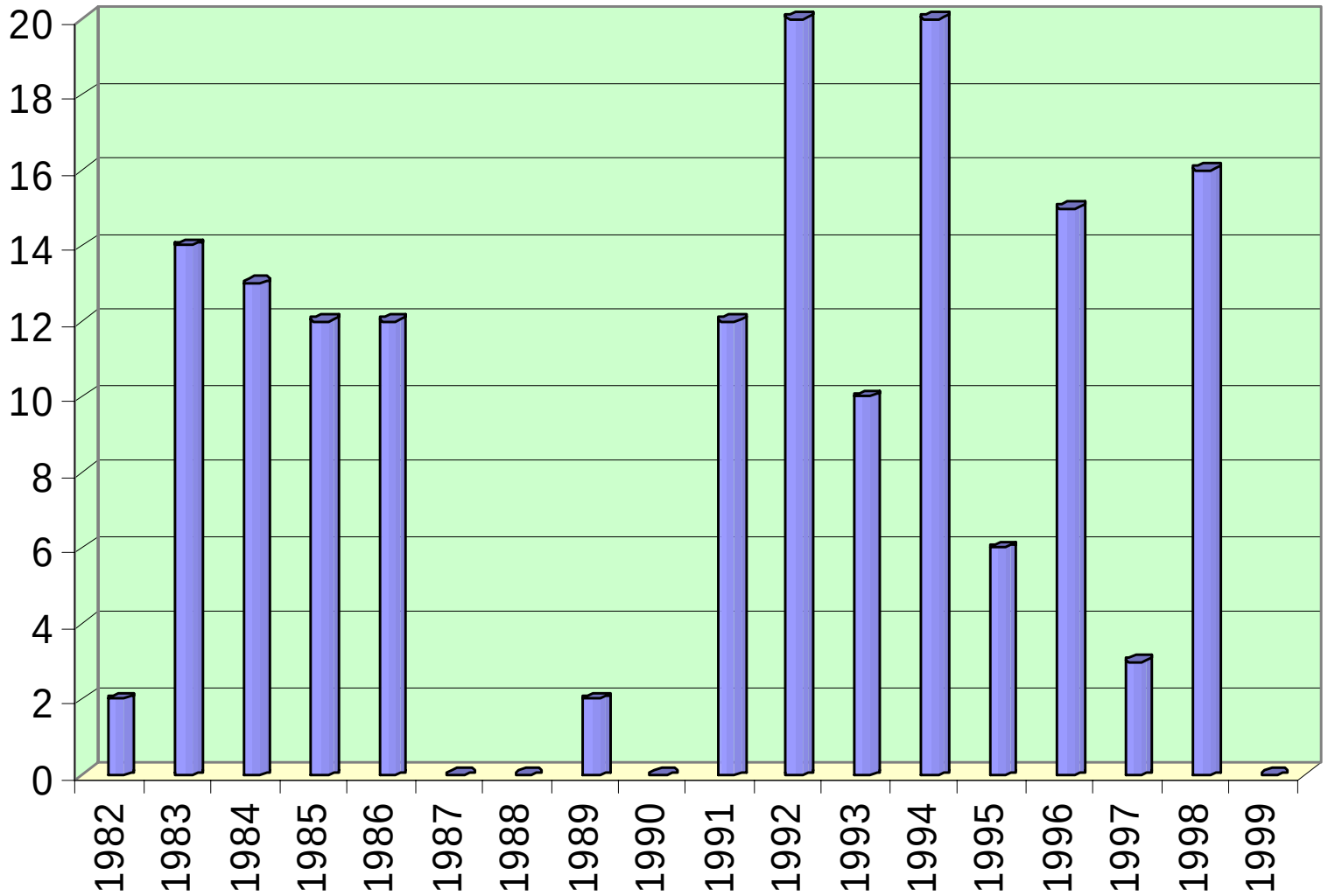
Get Away Special (GAS)



GAS Program Status

- Since 1982, 157 Payloads Have Flown on 35 STS Missions
- 16 GAS Payloads in 1998 on 5 STS Missions
- No GAS Flights in 1999
  - STS-96 5/99 Higher Priority SSPP payloads: STARSHINE
  - STS-93 7/99 Dedicated cargo bay to Chandra Observatory
  - STS-103 *10/99* Hubble Servicing Mission
  - STS-99 *11/99* Dedicated cargo bay to SRTM
- CURRENTLY:
  - 439 GAS Reservations
  - 28 “Active “ Payloads
    - 9 Educational Class
    - 15 Commercial/Foreign
    - 4 U.S. Government

GAS Payloads Flown (By Year)



GAS Flight Opportunities in 2000

- ISS Assembly Flights dominate the STS manifest through 2005
- Availability of cargo bay opportunities for small payloads is ***expected*** to continue…with the following new twists:
  - Fewer opportunities due to ISS priority
  - Greater probability of late changes (additions/deletions) due to ISS assembly logistics
  - New thermal scenarios

ISS Thermal Concerns for GAS

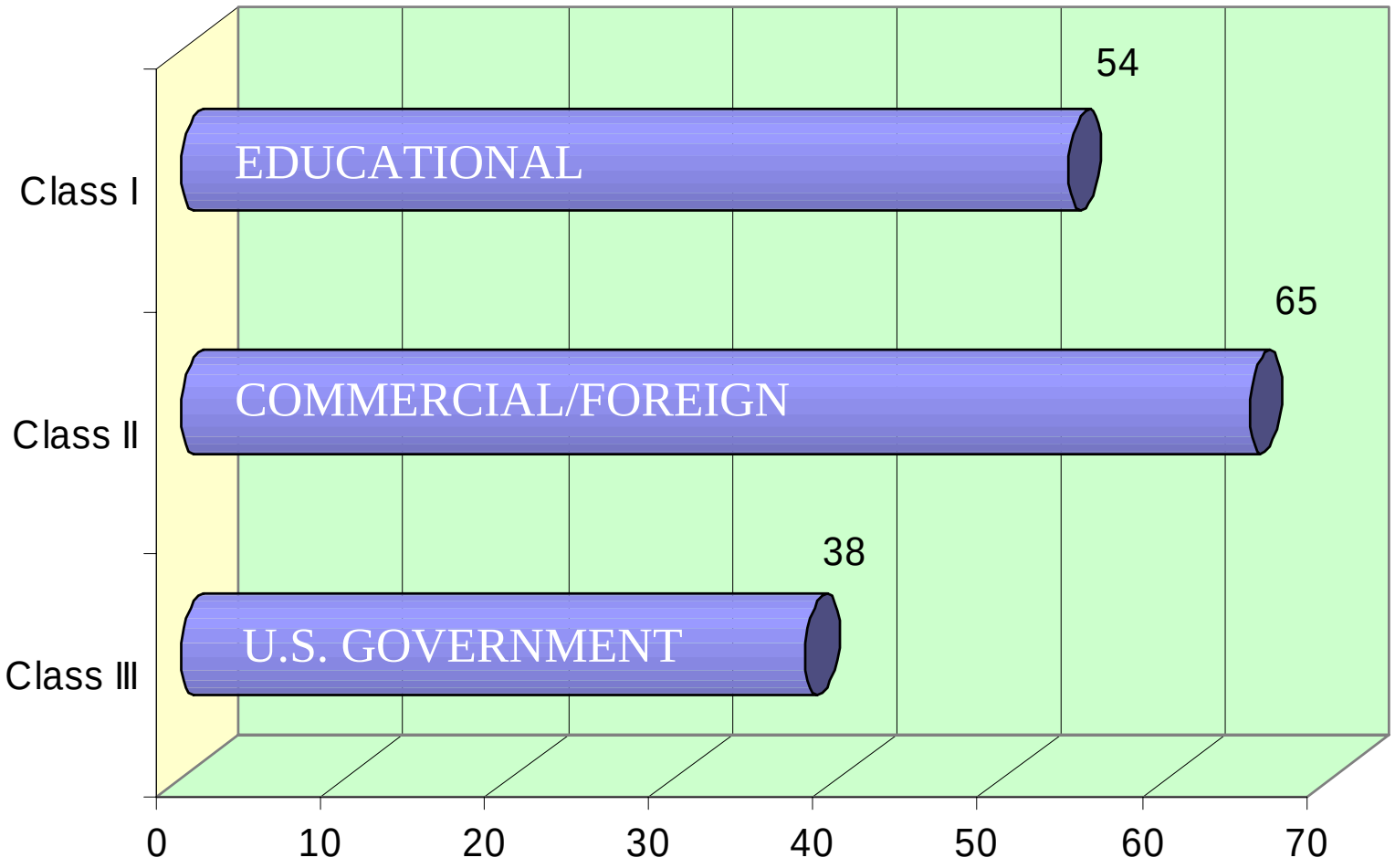
- XPOP Attitude
  - New Orbiter attitude not addressed in the current GAS Experimenter's Handbook
  - Maximizes use of smaller solar arrays until the 12A assembly mission by directing them towards the sun as much as possible
  - As a result, cargo bay exposed to the sun for long periods of time: Attached payloads in the cargo bay end up either in full sun or shaded by ISS components
- GAS Electronics Thermal Constraints
  - Operational: -40 to +60 C
  - Current Situation: Two ISS flights to date; Still very little information available at typical GAS manifest milestone as to predicted thermal profiles

GAS Policy Changes

- Code of Federal Regulations (CFR 1214) governs GAS
  - Only flight project other than STS itself that is covered in Federal law
- Policy has remained essentially unchanged, except for flight prices, since the program's inception:
  - Class I Educational
  - Class II Commercial/Foreign
  - Class III U.S. Government

  Rotation Sequence: II, I, II, III, . . .
- Key Aspects of Policy
  - Payloads must be "Research & Development"
  - SSPP is required to follow CFR w.r.t. manifesting payloads
  - "2 in 20" Rule
  - Launch Services Agreement

GAS Payloads Flown (By Class)



GAS Policy Changes, continued...

- In 1998, NASA Administrator Dan Goldin requested a greater focus on educational use of the GAS program:

"... The Nation's educational system looks to NASA for inspiration and to exemplify doing things that once were only imaginable... Future leaders of America, even if not astronauts, scientists, or engineers, must have a fundamental understanding of science, mathematics, and technology…."

- NASA's Administrator, Mr. Daniel Goldin, submitted testimony before the Committee on Science, United States House of Representatives on April 28, 1999.

GAS Policy Changes, continued...

- New Policy Under Development; Primary Change:
  - Class I U.S. Educational
  - Class II U.S. Government
  - Class III U.S. Industry/Commercial/Private
  - Class IV International Educational
  - Class V International Industry/Commercial/Private

  Rotation Sequence: I, II, I, III, I, IV, I, V, . . .

- Status:
  - Draft policy out for public comment in late 1999/early 2000

GAS Documentation Updates

- Existing Complement of Documentation:
  - –Experimenter's Handbook (Red book)
  - –Experimenter's Guide to the STS Safety Review Process and Data Package Preparation (Green book)
  - –Various template documents and example safety data packages
  - –Governing STS documentation provided as well (NSTS 1700.7B)

- New GAS Experimenter's Handbook
  - –Full documentation available on-line; binder-ready hard copy available to reservation holders
  - –Integrated "Red" and "Green" information
  - –Improved explanation of *Process* and key milestones/requirements

- Status
  - –SSPP Review 12/99
  - –On-line Early 2000

The GAS "Process" - Agreements

- **Launch Services Agreement (LSA):** Customer agreement with NASA HQ, implementing CFR regulations, establishing flight price, payment schedule; establishes customer's position in priority queue

- **Payload Accommodations Requirements (PAR):** Customer agreement with NASA-GSFC SSPP; establishes payload basic requirements (size, weight, operational plans); initial look at potential hazard identification

- **Payload Integration Plan (PIP):** NASA-GSFC SSPP agreement with Johnson Space Center (JSC) (required for all STS payloads); data drawn from PAR establishing payload basic parameters and requirements; Annexes to PIP contain technical info that GSFC submits and updates up until launch

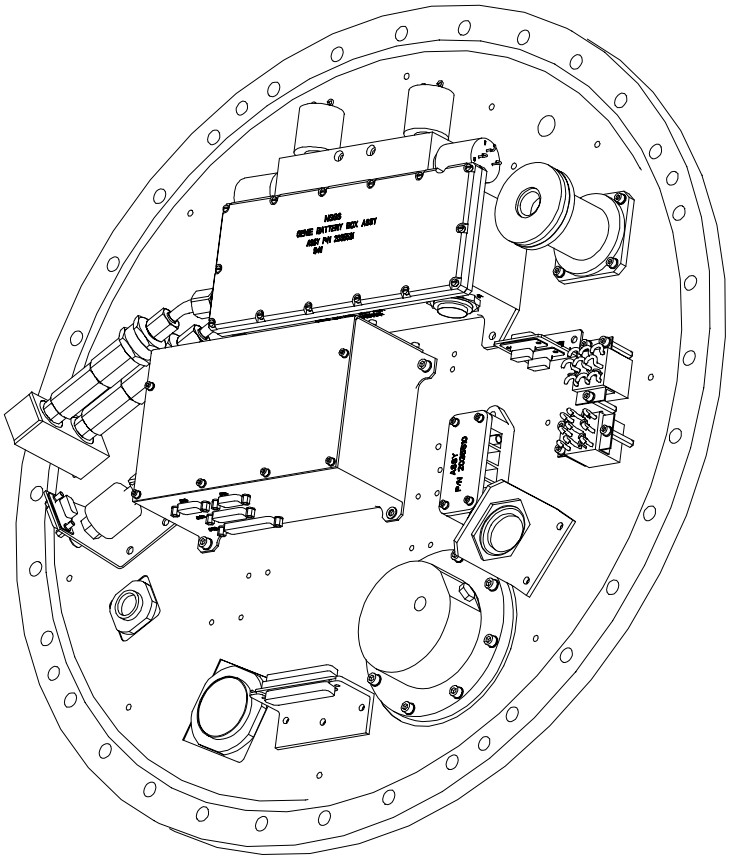
The GAS "Process" - Safety

- **Safety Data Package Submittals (Preliminary, Final, Phase III SDP):** Increasingly detailed data packages, submitted at conceptual design, final design, and as built/tested hardware milestones, describing payload design, identification and disposition of hazards; analyses showing benign nature of experiment (or, in some cases, proving effectiveness of controls for hazards)

- **For a given payload to be eligible for a manifest opportunity:**
  - **PIP signed by JSC**
  - **Final SDP submittal**

Next Generation GAS System (NGGS)

- Original flight avionics still in use today
  - Circa 1979
  - No telemetry available, on-orbit or post-flight
- NGGS Requirements
  - Maintain same customer interfaces and crew participation level
  - Incorporate some self-diagnostic capabilities
  - Utilize existing IEP structural hardware envelope
- Notable Features
  - Identical support to advertised customer features (relay options, malfunction inputs, door option)
  - Collects, stores and reports carrier hardware telemetry (temperatures, pressure, voltages)
  - RS-485 digital interface; modular hardware implementation; expandable
- Status
  - Fabrication of first units in progress
  - Qualification testing in late 1999
  - First flight: Scheduled for TBD GAS payloads flying on HEAT Hitchhiker bridge in late 2000 (?)



GAS Website Address

There is more information at the GAS Website:

http://www.wff.nasa.gov/~sspp/gas/gas.html

You can also reach the GAS page from the SSPP main page:

http://sspp.gsfc.nasa.gov